



**City of Burlington, NC**  
Engineering Department  
P.O Box 1358  
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# CONSTRUCTION DOCUMENTS CHECKLIST FOR PLAN REVIEW

30 November 20017, 6<sup>th</sup> Revision

## Section 1: General Plan Preparation Guidelines

- ☐ Sheets shall be no larger than 36" x 24" plan and profile paper.
- ☐ Minimum text size shall be 1/8"
- ☐ Scale on plan view shall be no smaller than 1" = 50'; scale on profile view shall be no smaller than 1" = 50' horizontally and 1" = 5' vertically using a grid showing 1' intervals.
- ☐ Cover sheet shall have a vicinity map at a scale no smaller than 1" = 200'.
- ☐ Provide a legend indicating existing and proposed lines, features and symbols.
- ☐ Cover sheet shall include all general notes, owner's name, telephone number, and mailing address.
- ☐ All elevations shall be given in relation to mean sea level; elevations in profile view shall be labeled in 10' intervals on the heavy lines (Ex. 350, 360).
- ☐ Benchmark elevations and locations shall be shown on plan view.
- ☐ Plan views shall have a north arrow on each drawing.
- ☐ Each drawing shall have the following information in the title block: Street or project title, limits, horizontal and vertical scales, original date, revisions date, drawing number, checked by and drawn by. Recommended placement is lower right-hand corner.
- ☐ All drawings sealed, signed and dated by a NC Professional Engineer.
- ☐ Plan view shall show all actual street names. State road numbers shall be shown if applicable. Plan view should also indicate whether street is asphalt, concrete, gravel or dirt. Proposed street & Right-of-way widths will be dimensioned back-to-back and labeled in plan view.
- ☐ Plan view shall show proposed and existing curb and gutter, storm sewers, drainage structures, driveway pipes, water mains, sanitary sewer mains, etc. All available elevations shall be shown on the profile view. Direction of flow shall be shown on plan view for all sanitary sewers and storm drains.
- ☐ Existing utility lines shall be shown and labeled on plan view and indicated in the legend.
- ☐ Plans shall show final proposed locations and dimensions of all water, storm drain, and sanitary sewer lines, including services to each property line for water and sanitary sewer, devices to be installed on the system, catch basins, culverts, ditches, including grades, pipes sizes, elevations, assumptions, calculations, invert elevations for all inlets and manholes and profiles of sanitary sewer lines.
- ☐ Plan shall bear the note: "All construction to be in accordance with all City of Burlington, Engineering Specifications and Standard Details, latest edition."
- ☐ All existing and proposed water, storm drainage and sanitary sewer easements shall be shown on all applicable sheets.

## Section 2: Water Distribution Design

Applicant Validation		COB Staff Check	
N/A	Included		
_____	_____	_____	All fittings, valves, hydrants, plugs, etc. must be called off in a fitting box with the number of mechanical restraint retainer glands. See Example
_____	_____	_____	In all residential districts, the maximum distance between fire hydrants, measured along public street centerlines and/or other private travel ways shall be 500 feet.
_____	_____	_____	Valves should be installed on all branches from feeder mains and between mains and hydrants according to the following schedule: <ul style="list-style-type: none"> <li>a. three (3) valves at X's (crosses),</li> <li>b. two (2) valves at T's (tees) and</li> <li>c. one (1) valve on single hydrant branch</li> </ul>
_____	_____	_____	Water mains 12" and larger in diameter which have a change in elevation of fifteen feet or greater shall have an air release at high points and blow-off capability at the low point of the water line.
_____	_____	_____	Show water service to each lot and show the water meter 1 foot on street side of the right-of-way line. The developer will be responsible for the cost of relocating services and meters that fall within driveways.
_____	_____	_____	Multi-family, Commercial and Industrial Developments - Hydrants shall be located within 500 feet of most remote portion of building(s).
_____	_____	_____	Minimum Radius for ductile iron push on joint pipe without fittings: 4" - 205'   6" - 205'   8" - 205'   10" - 205'   12" - 205' 14" - 340'   16" - 340'   18" - 340'   20" - 340'   24" - 340'
_____	_____	_____	On all 12" and larger water main provide joint restraint calculations for all fittings, valves and dead ends.
_____	_____	_____	Main line valves on straight runs between street intersections shall be spaced no greater than the distances given below and shall be located within fifty (50) feet of the nearest hydrant to their location. Main Size Maximum Spacing 6"- 600'   8"- 900'   12"- 1000'   16"- 1000'   24"- 1500'
_____	_____	_____	When phasing a project, locate valves in order to not place any existing service out of water. When extending water line to a new phase add additional valves beyond above requirements if necessary.
_____	_____	_____	Indicate in profile vertical separation <b>12"</b> water to storm drain <b>18"</b> water to a sanitary sewer.
_____	_____	_____	Provide 4 foot of cover minimum over water main and 5 foot of cover minimum at air release valve installation.
_____	_____	_____	If water main is outside of street right-of-way indicate 20 feet easement. Show all existing and proposed water line easements
_____	_____	_____	Indicate water main material Ductile Iron Pipe and class
_____	_____	_____	Indicate how new water will connect to existing water main.
_____	_____	_____	Indicate backflow prevention.
_____	_____	_____	Hydrant leads are off hydrant tees unless at the end of a water main.
_____	_____	_____	If road bore and jack is required show bore size (dia.), length, thickness of steel encasement and length of restrained pipe through encasement.

### Section 3: Sanitary Sewer Collection Design

Applicant Validation		COB Staff Check	
N/A	Included		
_____	_____	_____	All gravity sewer mains shall be designed and sized to serve the total natural drainage basin. The total off-site drainage area in acres must be shown on the plans and calculations should be submitted to the Engineering Department upon request to justify pipe sizing. An 8-inch main shall be the minimum size permitted.
_____	_____	_____	When preparing the plans for sewer mains, deflection angles for all horizontal turns shall be shown on the drawings. All elevations shall be tied to mean sea datum and the benchmark shall be shown or described on the plans. Spot elevations on 100 foot stations, 75 feet from the centerline on both sides, shall be shown on the plan, or cross-sections supplied to ensure that the sewer can adequately serve the property. The plans shall show the manhole number (MH #1 etc.), top elevation, station, depth including invert elevations, length of sewer reach, and slope (in percent). Established creek centerlines and inverts will be platted on the sewer plan and profile sheets, adjacent to proposed sewer alignment, within 75 feet.
_____	_____	_____	Grades for sanitary sewers must be such that a minimum flow velocity of 2 feet per second is maintained. The minimum grade for an 8-inch sewer line is 0.50%. If necessary for slope to be less than 0.50% provide reason.
_____	_____	_____	Minimum widths of permanent and construction sanitary sewer easements, for public sewer mains, are: Permanent / Construction 8" & 15" main - 30 feet wide / 20 feet wide 18" & 24" main - 40 feet wide / 20 feet wide Larger size easements may be required based upon the depth of installation or other consideration as determined by the Engineering Department. Sewer mains shall be centered in the easement. Indicate all existing and proposed easements.
_____	_____	_____	If less than 3 feet of cover over proposed sanitary sewer, pipe shall be ductile iron.
_____	_____	_____	Show sewer service terminating at a cleanout one foot beyond right-of-way. Do not tie 4" lateral sanitary service directly into manhole, except at the end of a Cul-de-sac. Cleanouts shall not be placed in drives
_____	_____	_____	Indicate in profile vertical separation <b>12"</b> sanitary sewer to storm drain and <b>24"</b> sanitary sewer to water main.
_____	_____	_____	Sanitary sewer lines shall be located a minimum distance of 100 feet from the center of any well used as a community or private water supply. This buffer may be reduced to 25 feet provided that the sanitary sewer lines are constructed of materials and joints that are equivalent to water main standards.
_____	_____	_____	The maximum length of sewer line, which shall be constructed between manholes, shall be four hundred (400') feet.
_____	_____	_____	Indicate pipe bedding requirements limits in the profile for VCP when Class B Bedding is required. (COB Detail SS-1)

### Section 3: Sanitary Sewer Collection Design - cont

Applicant Validation		COB Staff Check																										
N/A	Included																											
_____	_____	_____																										
		The elevation of all sewer lines at creek crossings shall be set such that the top of the pipe is at or below the elevation of the stream bed or for crossings above water level, the bottom of the pipe should be located above the 25-year flood elevation.																										
_____	_____	_____																										
		Sewer manholes located within the 100-year flood plain shall be constructed in accordance with Page 5 of the "Standard Specification Drawings" for watertight manholes, or sewer manholes located within the 100-year flood plain shall have a minimum height of two (2') feet above the 100-year flood elevation.																										
_____	_____	_____																										
		Drop in manhole greater than 6" but less than or equal to 30" indicate concrete slide. If drop is greater than 30" provide an outside drop manhole.																										
_____	_____	_____																										
		Public sanitary sewer pipe material shall be indicated in profile. Material shall be vitrified clay pipe or Protecto 401 coated ductile iron pipe where authorized. Indicate Fernco type coupling between connections of different material. Private sanitary sewer pipe material is choice of engineer certifying the system.																										
_____	_____	_____																										
		Where it is not possible to provide gravity sanitary sewer service, indicate which lots will have a private pump system.																										
_____	_____	_____																										
		Minimum Slope requirements:																										
		<table><tr><th>Dia of Pipe (inches)</th><th>Minimum Slope (Feet per 100 feet)</th></tr><tr><td>8</td><td>0.50</td></tr><tr><td>10</td><td>0.28</td></tr><tr><td>12</td><td>0.22</td></tr><tr><td>14</td><td>0.17</td></tr><tr><td>15</td><td>0.15</td></tr><tr><td>16</td><td>0.14</td></tr><tr><td>18</td><td>0.12</td></tr><tr><td>21</td><td>0.10</td></tr><tr><td>24</td><td>0.08</td></tr><tr><td>27</td><td>0.07</td></tr><tr><td>30</td><td>0.06</td></tr><tr><td>36</td><td>0.05</td></tr></table>	Dia of Pipe (inches)	Minimum Slope (Feet per 100 feet)	8	0.50	10	0.28	12	0.22	14	0.17	15	0.15	16	0.14	18	0.12	21	0.10	24	0.08	27	0.07	30	0.06	36	0.05
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## Section 4: Storm Drainage Design

Applicant Validation		COB Staff	
N/A	Included	Check	
_____	_____	_____	Provide Storm Sewer Calculations on plans - 10 yr. Storm minimum design on storm drainage upstream fully urbanized - 25 yr. Storm minimum design on roadway cross culverts with upstream conditions fully urbanized. - Indicate all assumptions
_____	_____	_____	If storm drainage is off the right-of-way, a minimum 20 feet wide permanent Storm Drainage easements must be shown.
_____	_____	_____	Provide Inlet/Outlet Protection (Rip/Rap)
_____	_____	_____	All Drainage Areas used in calculations shall be accurately depicted on a minimum 400-scale plan.
_____	_____	_____	Indicate storm drain pipe material. In right-of-way use Reinforced Concrete Pipe. Outside of right-of-way HDPE pipe or RCP.
_____	_____	_____	Provide calculations used to determine cross-section and lining for all swales, ditches and channels, (permanent and/or temporary).
_____	_____	_____	Provide calculations for design of outlet structure and emergency spillway for permanent detention/retention measures.

## Section 5: Erosion and Sediment Control Design

Applicant Validation		COB Staff	
N/A	Included	Check	
_____	_____	_____	Dimensions and locations of all permanent erosion control measures shall be shown on all applicable plan view sheets.
_____	_____	_____	Attach a <u>NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, AND NATURAL RESOURCES LAND QUALITY SECTION</u> ; Erosion and Sedimentation Control Plan Checklist <a href="http://www.dlr.enr.state.nc.us/images/controlplanchecklist.doc">http://www.dlr.enr.state.nc.us/images/controlplanchecklist.doc</a>
_____	_____	_____	Provide detailed sequence of construction.
_____	_____	_____	Provide a calculated area of disturbance in ACRES. Indicate limits of disturbance on plan.
_____	_____	_____	All existing Topography on site as well as 100' off-site throughout the boundary. (buildings, roads, sewer, water...)
_____	_____	_____	Overall grading of the site including proposed grades for all lot corners, side/rear yard swales, finish grades for all lots/buildings and proposed contours.
_____	_____	_____	Provide adequate surface area per "efficiency based" design requirements for temporary sediment traps, rock dams and sediment basins (use C=0.35 Tc=10 min and i <sub>10</sub> =5.75 in/hr).

## Section 6: Roadway and Street Design

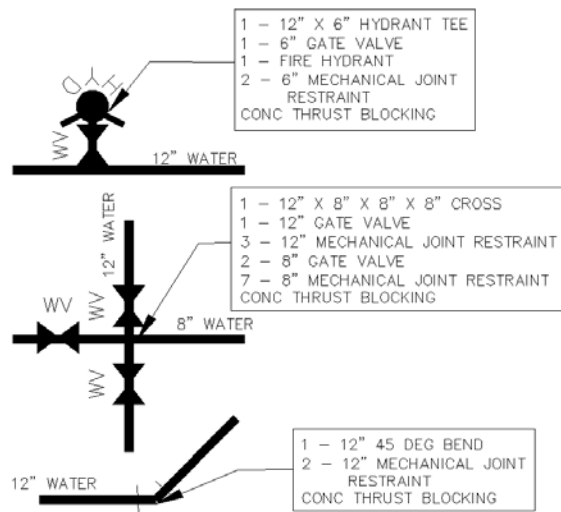
<b>Applicant Validation</b>		<b>COB Staff</b>	
<b>N/A</b>	<b>Included</b>	<b>Check</b>	
_____	_____	_____	Street typical sections shall be on the cover sheet or the first sheet of plan and profiles and will include street and right-of-way width, sidewalk location, cross-slopes, and pavement design. Do not place aggregate under curb for City streets.
_____	_____	_____	Pavement Cross Section meets or exceeds City Standards – 6" ABC, 1 ½" of SF 9.5B) and 1" SF 9.5A Bit. Pavement. No ABC under curb and gutter.
_____	_____	_____	Plan view shall show all property lines and lot frontages. Existing property lines shall be labeled "E.I.P." Right-of-way lines shall be dimensioned and labeled "R/W."
_____	_____	_____	Complete street curve data shall be shown on plans. This information shall include, but is not limited to: intersection radii, length of all arcs, internal angles, sight triangles, intersection centerlines, superelevation rates, if any along with the top of curb or edge of pavement profiles, vertical curve length, rate of vertical curvature (K), PVI, PVC, and PVT station and elevation, horizontal curve length, tangent, centerline radius, and delta.
_____			Provide spot elevations around the top of curb at all intersection.
=====	_____	_____	Provide a USPS Cluster Box Unit for Subdivision. Provide tapers as per NCDOT guidelines and / or AASHTO. Provide sidewalk / pedestrian access to Central Mailbox Unit. Note to provide ADA compliant boxes and access to meet or exceed USPS standards. Note the size and # of boxes. Show ADA accessible routes and parking. Label Central Mailbox Unit.

Last Revised 11-29-2017

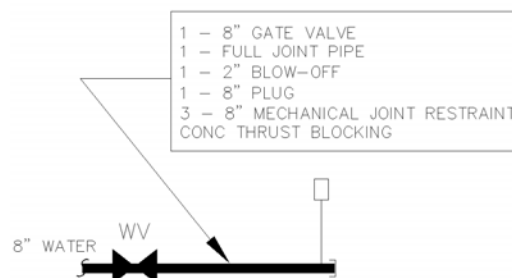
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## Section 7: Examples

## Water Main Fitting Box



### End of Water Line with Future Connection



## Typical Service Layout

